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CHRONOLOGY OF THE TANO RUINS, NEW MEXICO¹

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IN the course of archeological investigations pursued in New Mexico under the auspices of the American Museum during the past four years some chronological data have come to light which it seems proper to bring to the attention of students without further delay. The data consist mainly of observations on the stratigraphic relationship of several widely distributed types of pottery. Other facts of importance, such as architectural variation, exist, but these are less convincing and besides seldom immediately useful in determining the relative age of a ruin. This preliminary treatment is therefore deliberately confined to a presentation of the stratigraphy, together with a brief outline of the distinguishable ceramic features and the application of the results thus obtained to the ruins in the limited area under investigation.

GENERAL CONSIDERATIONS

As is well known, there are in the Southwest several more or less localized types of prehistoric pottery, such as ornamentally indented coiled ware, several distinct varieties of painted wares, and likewise, a somewhat varied group of glazed ware. Dr. J. W. Fewkes has only recently made us acquainted with another hitherto

¹ This article is a preliminary report of one phase of the systematic archeological exploration and excavation in the Rio Grande valley undertaken in 1912 by the Department of Anthropology of the American Museum of Natural History.

little-known ceramic type¹ of a unique character which was most intensively developed in the Mimbres valley but which occurs also in the adjacent Rio Grande country and probably beyond, towards the Pecos river. This fine, relatively ancient ware is of the painted order and seems to mark the southeastern limits of Pueblo culture in the United States.

To the north of the Mimbres center, extending up the Rio Grande drainage basin almost to the Colorado boundary, is another ceramic area characterized primarily by glazed pottery. The eastern limit of this area is somewhat uncertain, but it appears not to extend beyond the longitude of the lower Pecos and Red rivers, while in the west it remains within the Rio Grande basin except for a slender arm extended by way of Laguna and Acoma to the Zuñi valley where it again expands, taking in the country drained by several tributaries of the Little Colorado, close to the Arizona-New Mexico boundary. Leaving out of account probable sporadic occurrences in the Hopi country to the northwest, at Ysleta del Sur to the south, and also at reported minor sites along the Canadian river and elsewhere on the eastern plain, glazed pottery is distributed over an area approximating 20,000 square miles in extent, a stretch of territory which may be said to constitute the northeastern border section of Pueblo culture.

The greater portion of the country in question seems unfit for almost any sort of aboriginal existence, being either mountainous or desert-like plateau, lacking water. But the flood-plain of the Rio Grande and some of its tributaries, likewise the lower levels of the high relief with its springs and small patches of tillable soil offered inducements to a sedentary agricultural people. There is hardly a suitable spot that does not show some trace of former Indian life. To be sure, many of the settlements were small and perhaps temporary. But, disregarding those sites, there are on record for the region about three hundred ruins, some of them very large. Judging from results obtained in the Tano district alone, it is safe to say that a thorough-going examination of the entire

¹ "Archeology of the Lower Mimbres Valley, N. M." (*Smithsonian Miscellaneous Collections*, Vol. 63, No. 10, Washington, 1914.)

glazed pottery area would reveal probably twice the listed number of abandoned pueblos. The situation thus developed, area and environment being taken into consideration, becomes analogous to that observed in parts of California and in the Mound Builder area. That is, the implied population mounts to figures out of proportion on the one hand, to the productivity of the country and on the other, to the historically known facts. We may, therefore, reasonably suspect a lengthy occupation by either a shifting or a changing population; in other words, that the ruins in question are not of the same age.

Hitherto no archeological work of consequence has been done within the limits of the glazed pottery area, except in the northwestern part of it, *i. e.*, in the Pajarito plateau district, where Dr. E. L. Hewett and his associates of the Archaeological Institute of America have been engaged for some years. However, the conditions here do not seem thus far to have yielded precise chronological information. At the same time it is only fair to state that it has been more or less apparent to every student since Bandelier made his first observations that the Rio Grande Pueblos underwent certain cultural transformations in prehistoric times.¹ In the region under investigation by the American Museum, a district which lies southeast of the Pajarito plateau and somewhat central in the glazed pottery area, this fact was evident from the beginning. Thus, traces of "small-house" ruins marked by sherds of painted pottery of the black-on-white variety, as well as by coiled ware, were found in several places during the reconnaissance and it was easy to see that these sites antedated the large Tano ruins, say of the Galisteo basin, which were characterized chiefly by glazed pottery. At the end of the first season's work one of these glazed types of pottery had been eliminated as of historic date, having been found constantly associated with bones of the horse and other domestic animals and in fact only in particular sections of such

¹ Since the above was written Dr. A. V. Kidder has published his paper entitled: "Pottery of the Pajarito Plateau and of Some Adjacent Regions in New Mexico," *Mem. Am. Anthropol. Assoc.*, Vol. II, Pt. 6, 1915, in which he characterizes four styles of pottery and tentatively places the same in chronological order.

pueblos as San Cristobal, San Lazaro, San Marcos, Galisteo, and San Pedro Viejo, all but the last of which were known as Mission centers down to about 1680. But there were still apparently at least two distinguishable types—with several variants—of glazed pottery, the relative ages of which could only be surmised because both occurred in association with the strictly historic ware, though not with the same frequency. As no actual excavation was undertaken during 1913, nothing further was accomplished until 1914, when the importance of the subject had fairly impressed itself. By the opening of the season it was reasonably certain, both from internal evidence and from various general considerations, what was the chronological order of the four apparent pottery types, but tangible proof was still wanting.

This desideratum, as it happened, was obtained at the first site excavated, viz., San Pedro Viejo or Paako, a pueblo ruin lying on the southwestern edge of the Tano territory, near the head of the valley separating the San Pedro and Sandia mountains. Later, these findings were verified and supplemented by data obtained from a refuse deposit at Pueblo San Cristobal on the east-central border of the Tano country, *i. e.*, at the west base of the Trans-Pecos highlands, about seven miles south of Lamy. Again in 1915, verifications were made at the abandoned pueblos known as San Marcos, Cieneguilla, and Arroyo Hondo or Kuakaa, these last sites being all well toward the northern and northeastern limits of the Tano range and not far from Santa Fé. The result of these observations is the identification and chronological order of four, or practically five, successive styles of pottery corresponding to as many periods or stages in the history of the people occupying the late Tano and adjacent Pueblo territory. What follows is intended merely as a brief outline of the facts in the case.

STATISTICAL DATA

The data required to establish a chronology were of course to be looked for only in those places that bore evidence of long settlement. Actually superposed successions of ruins or large stratified refuse deposits are not as common, however, as might be expected, and

where they do occur, there is often no appreciable differentiation in the remains. Nevertheless, at San Pedro Viejo two superpositions were discovered, one showing contact of the historic type of glazed pottery with another earlier type of glazed ware, and the other showing contact of the older of the two preceding glazed types with the black-on-white painted ware. These were, however, merely clean-cut superpositions showing nothing but time relations. Towards the end of the 1915 season another case of contact similar to the last of the two mentioned above was found at Pueblo Kuakaa. But, as before, these sections, being incomplete in that they showed no trace of the fourth type of glazed ware, could not be taken at face value. That is to say, while the positions of the two extreme members of the pottery type series were fixed, the chronological order of the two middle members was not proved, though strongly suggested. However, at Pueblo San Marcos and also at Pueblo Cieneguilla, both in the ruins proper and in the refuse heaps, the ancient type of glazed ware twice noticed in contact with the black-on-white ware was found actually mixed with it, the one gradually replacing the other. This latter was the evidence wanted, because it accounted for the otherwise unknown time interval that separated the merely superposed occurrences of types and from the point of view of the merely physical relationship of contiguity, connected them. The remaining fourth type of pottery could now take only one position in the series, namely, that of third, counting from the bottom. But all these various superpositional and transitional sections are incomplete and fragmentary, each showing merely the time relations of two successive pottery types at some place or other in the total series of four or five types. Hitherto no complete section has been found, and probably does not exist unless possibly it be at Pueblo Pecos. This site, according to Bandelier, shows evidence of settlement in the days of black-on-white pottery and, as is well known, was inhabited down to about 1838.¹ The Tano section that comes nearest to filling the require-

¹ Since the above was written Dr. A. V. Kidder of the Andover-Pecos Expedition began work at Pecos and, if I understand the situation correctly, he has found a complete chronological section which tallies quite closely with observations in the Tano district.

ments was found at Pueblo San Cristobal. Here are to be seen the dwindling remains of a large refuse heap, still measuring about ten feet in depth on the vertical exposure in the bank of the creek



FIG. 20.—The San Cristobal refuse section, 9 ft. 8 in. thick, yielding three successive types of pottery. Note skull protruding from original surface soil.

which has undercut and carried away the missing part (see fig. 20).¹ Human burials were visible at different levels of this débris when first seen in 1912, and in order to obtain some skeletal material a five-foot bench was excavated from one side of the artificial deposit to the other, along the edge of the creek. At that time it was noticed in a general way that different types of pottery fragments prevailed at different levels but no effort was made, until too late, to keep them separate. This happened partly because I was not continually present during excavation, having decided beforehand that chronological data were to be obtained in the ruins only and not in burial mounds where grave diggers in overturning the débris again and again had surely destroyed the planes of stratification. But as all data from the ruins remained inconclusive after practically three seasons' work I returned to San Cristobal in 1914 to make a test. A visibly stratified section of the refuse exposure showing no evidence of disturbance was selected and a block of this measuring 3 by 6 feet on the horizontal and nearly 10 feet deep was excavated. I performed this work with my own hands, devoting fully three days to the task. The potsherds from each separate foot of débris were kept apart and the finally classified numerical results appear in the following table.

This test is not perhaps all that could be desired; but inasmuch as its results in their general bearings agree absolutely with the partial data obtained before and since at other sites, no effort has been made to strengthen the inevitable conclusions. Had a greater volume of débris been handled, the figures of the table might possibly have lined up a little better and possibly not, because a larger block of débris would doubtless have included areas disturbed by burials, etc. Even with the conditions as given, viz., a visibly stratified and undisturbed block of deposit, accidents are entirely probable and no stress should be laid on individual figures, which at best are more or less arbitrary. The table as a whole is, however, both consistent and intelligible.

¹ For a larger general view of the refuse deposit, its relation to the topography and adjacent ruins, see also Pl. I. of my descriptive report entitled "Pueblo Ruins of the Galisteo Basin." (*Anthropological Papers, American Museum of Natural History*, vol. XV, pt. 1, 1914.)

Thickness of Section	Corrugated Ware	Biscuit Ware	Type I, Two, and Three Color Painted Ware	Type II, Two Color Glazed Ware			Type III, Three Color Glazed Ware
			Black-on-White Painted Ware	Red Ware, Black or Brown Glaze	Yellow Ware, Black or Brown Glaze	Gray Ware, Black or Brown Glaze	Gray, Yellow, Pink and Reddish Wares, Combination Glaze-and-Paint Design
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1st. ft.	57	10	2	24	23	34	5
2d. "	116	17	2	64	90	76	6
3d. "	27	2	10	68	18	48	3
4th "	28	4	6	52	20	21	
5th "	60	15	2	128	55	85	
6th "	75	21	8	192	53	52	1 ?
7th "	53	10	40	91	20	15	
8th "	56	2	118	45	1	5	
9th "	93	1 ?	107	3			
10th "	84	1 ?	69				
= 8 in.	(126)		(103)				

Examining the table as it stands, we see at once that column 1 has no chronological significance, corrugated cooking pottery of essentially the same style having been in use throughout the time period represented by the ten-foot accumulation of débris. Column 2, likewise, is relatively useless for chronological purposes because the so-called "biscuit ware" indicated by it runs a rather unsteady course from beginning to end. The rest of the table is as satisfactory as could well be expected, whether we study the columns as individual or as related units. Column 3, representing black-on-white painted ware—called Type I—has its maximum expansion at the bottom and becomes negligible about halfway towards the top. The few fragments found in the upper four feet indicate probably heirloom vessels held over from early days or else specimens dug out of the ruins and not at all that this type of ware continued to be manufactured.¹ Whatever historical significance attaches to the fact that the ware was at its maximum development when the refuse began to accumulate we must leave for later consideration. The 4th, 5th, and 6th columns, representing contemporary variants of early glazed ware—called Type II—show

¹ The figures 69 and (103) in the 10th foot of Column 3 may need explanation. This 10th foot of débris in actuality measured only 8 inches in thickness and contained 69 potsherds. Had the débris measured a full 12 inches it should have contained about 103 potsherds. This will also explain the lower figures in Column 1.

very nearly normal frequency curves. That is, the style of pottery indicated came slowly into vogue, attained a maximum and began a gradual decline. At the point where the maximum is reached the preceding style will be noticed to have come to practical extinction. Column 7, standing for a ware combining painted and glazed ornamentation—called Type III—barely gets a showing; but it appears to make the proper start for another normal frequency curve, such as would be expected. This curve might doubtless have been completed by excavation in other refuse heaps of later date than the one here tried. As no such supplementary test was made the succeeding style of glazed pottery called Type IV, and referred to already as of historic date, cannot appear at all in this statistical way. Its position in the chronological type series is, however, fixed by an abundance of sound evidence. Finally, there may be mentioned, as Type V, a painted style of ware which is clearly the forerunner of modern Pueblo pottery, though it takes its start prior to 1680. This particular ware does not seem to occur at San Cristobal or in any but the westernmost of the supposed Tano ruins and is therefore perhaps of Keresan origin. With these few remarks we may leave the statistical aspect of the table to speak for itself and turn our attention to its pottery classification.

DESCRIPTION AND CLASSIFICATION OF POTTERY

As will readily be perceived, the validity of the numerical data set forth in the preceding table depends upon the classification of the pottery. In attempting this the same difficulty arose that confronts the student in dealing with any other series of related phenomena: there were overlappings and minor variations that for the sake of simplicity had to be ignored. Consequently, the separation of the Tano pottery into nine stylistic groups—seven of which appear in the table—is only an approximation to the actual facts. Future study of the ceramics is sure to compel further subdivision. But the basic characters here seized upon, are sufficiently distinct to warrant the classification as far as it goes; to have noticed minor variations would not have affected one way or the other the chronology to be established. The leading superficial characters of

most of the ceramic styles are indicated at the head of each column of the table and are also partially illustrated in fig. 21 and pl. VII. Those styles or contemporary varieties of styles that mark successive time periods have been named "Types." In part this terminology is no doubt arbitrary, but it will serve present purposes. Finally, it must be stated that in attempting the following comprehensive description of the pottery it was found necessary to consult the material dug out of the ruins as well as that obtained from the refuse heaps.

Corrugated or Coiled Ware (Column 1 of Table).—This ware is almost invariably covered with soot and was evidently made exclusively for cooking purposes. Hence, it naturally shows no such finesse of technique as is found to characterize the coiled ware outside the glazed pottery area. The ware ranges evenly from top to bottom of the refuse heap and occurs at all Tano ruins from the earliest to the latest; but as it undergoes no appreciable modifications in form, finish, or composition it must be left out of account for the present as chronological data. The leading characters of the ware are as follows:—

1. *Form, Size, etc.*—Normally a jar (olla), spherical body, short neck, flaring rim; occasional shoe or bird-shaped pots with knobs suggesting wings and tails; bowls uncertain. Sizes range from miniature to medium, approaching large.
2. *Surface Finish.*—Plain coil of primary and sometimes apparently secondary origin; indented coil (finger, finger-nail or sharp implement being used) with occasional effort at ornamental effect. Coiling and indenting often obscured either by wear or by "wiping" during process of manufacture. Some specimens of later times show evidence of a micaceous wash.
3. *Paste Composition.*—Gray colored clay, more or less tempered with coarse sand or crushed rock of crystalline nature. In early times some crushed pumice stone may have been added, while in later times micaceous substance was occasionally mixed in. Vessel walls are thin and brittle, the latter fact being due probably to constant use over the fire.

Biscuit Ware (Column 2 of Table).—This peculiar kind of pottery, which can be detected even by the touch, may or may not be a lineal descendant of the local black-on-white painted ware that precedes it (see Column 3 of Table). At any rate, it is the only

¹ For additional illustrations of several of these pottery styles, the student should consult Dr. Kidder's paper already cited.

style of painted pottery to maintain its vogue side by side with glazed ceramics from the beginning to the end of the latter's existence. There seem to be two kinds of biscuit ware, the most common being of a dull white or light gray color, the other of a dull yellowish tone. This latter has its probable forerunner in a more or less distinguishable variety of the black-on-white ware, but the prototype of the former has not been found thus far. Judging from both the time and space distribution of the typical biscuit ware, it seems probable that this was not manufactured by the Tano themselves, but was secured by trade either from the Keres or the Tewa in whose old territory it is very abundant. The most common ware exhibits the following characters:—

1. *Form*.—Bowls, often asymmetrical, hemispherical body with slight constriction near the top and a more or less flaring rim; with or without a flattened edge—approaching right-hand illustrations under Types I and II, fig. 21. Vessel walls unusually thick. Sizes range from small through medium towards large.

2. *Surface Finish*.—More or less smoothly polished, with and without an exceedingly thin wash of the paste material, in colors ranging from dull white to gray, depending on length and nature of use.

4. *Ornamentation*.—Geometric design on one or both sides, more or less crudely executed, in dull black paint. Rim edge sometimes dotted. Awanyu symbol common.

5. *Paste Composition*.—Homogeneous, finely granulated, light in weight, soft and porous, lacking cohesive strength. Tempering material practically absent, though occasional quartz-like crystals occur. The composition suggests nothing so much as ground-up pumice stone or volcanic tufa, a substance which is so very abundant in the Pajarito region where biscuit ware is most plentiful.

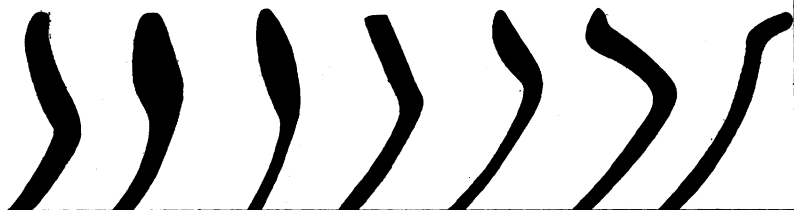
We come now to the type series of the pottery which establishes the chronological relations of the Tano ruins. Before proceeding to the description of these types special attention is directed to fig. 21, giving illustrations of the gradual specialization of the rim sections of the bowls.

Type I

Two and Three-Color Painted Ware (Column 3 of Table).—The pottery actually figuring in the table is a local variety of the black-on-white ceramics commonly identified with the generalized sub-

TYPE IV

GRAY WARE, GREENISH GLAZE. HISTORIC.
TWO-COLOR



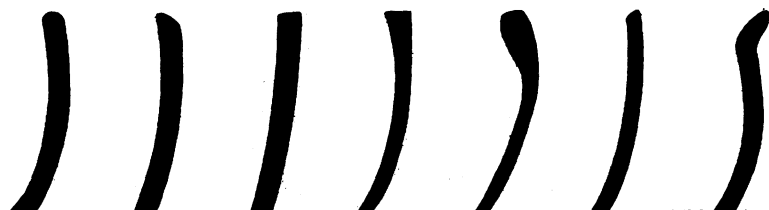
TYPE III

COMBINATION GLAZED-AND-PAINTED WARE.
THREE-COLOR



TYPE II

RED, YELLOW AND GRAY WARES, GLAZED.
TWO-COLOR



TYPE I

BLACK-AND-WHITE PAINTED WARE. ANCIENT.
TWO AND THREE-COLOR



FIG. 21.—Typical rim sections of Tano pottery, only bowls being represented. The very gradual specialization suggests genetic relationship.

stratum of Southwestern Pueblo culture.¹ Bandelier generally associated the ware with "small houses," *i. e.*, with what might be called a pre-Pueblo stage of sedentary life; but the data now at hand enable us to state that the large quadrangular form of village typical of the Rio Grande valley in later times was fully developed before the black-on-white pottery went out of style. The ware as a whole is perhaps not quite so fine as that of the Mesa Verde and Chaco regions on the one hand or of the Upper Gila and Mimbres regions on the other. It is particularly lacking in variety of form. In decorative symbolism it approaches the abandoned northwestern Pueblo area rather more than the southwestern and is little, if at all, inferior to it. The characterization of the ware follows.

1. *Form, Size, etc.*—Bowls predominate; ladles, *i. e.*, bowls, with handles, occur; jars very rare. Body form of bowls hemispherical. Rim section almost invariably plain, with top edge flat, rounded or pointed; occasional flaring lip (see Type I, fig. 21). Bowls come in small and medium sizes, vessel walls uniformly rather thin. Jars are miniature and medium.

2. *Surface Finish.*—Some bowls show trace of coiling or of basket mould on the outside. Surface rubbed more or less smooth on one or both sides. Slip or wash on one or both sides (often crackled) in colors—like the paste—ranging from dull white to blue-gray, depending on length and nature of use.

3. *Ornamentation.*—Applied inside of vessel (very seldom outside), rather skillfully, in black paint. Design geometric, rectilinear and curvilinear; hachure work and bands of thin parallel lines common; occasional pieces with paint dots on edge of rim as in Mesa Verde ware.

4. *Paste Composition.*—Variable on close examination. Matrix always of a grayish color, sometimes almost white with a bluish tinge (color of wood ashes), fine grained, closely knit, hard, and firm. Tempering material varies. Sand or crushed rock of a crystalline nature occurs in some pieces, but crushed basalt is more common. Sometimes the two are mixed and both may be nearly absent, as in the apparent prototype of biscuit ware.

Attention must be called at this time to the fact that an exceedingly small percentage of a black-on-red painted ware is generally mixed with the black-on-white, as is the case in the Chaco, Mesa Verde, and other districts. Thus far only bowl fragments have been found. These show a gray colored paste, red slip on

¹ There is some reason for believing that black-on-white ware in the Tano district has a local prototype not associable with Pueblo culture, but of this more at some future time.

both sides, geometric design in black on the inside, and sometimes a design in white on the outside. The ware is of a decidedly pleasing appearance and is probably a forerunner of the most prominent variant of the next type of ceramics to be considered.

Type II

Two-color Glazed Ware (Cols. 4, 5, 6 of Table).—As indicated in the table this ware comes in three distinct varieties of color—red, yellow, and gray—with ornamentation done in black or brown glaze. There are, however, several reasons besides brevity of treatment for grouping the three kinds of pottery under one and the same heading. Thus the variants to be described all bear some resemblance to the preceding type, they have in addition a number of common characters, and they are practically contemporary. Individually considered, the red ware seems to have arrived first—in fact it was probably the transition form, while yellow and gray wares held out the longest and gave rise no doubt to the succeeding type. At first sight the shift of types seems rather violent. For ages black-on-white and black-on-red wares had been in vogue and now we find the black-on-white replaced by black-on-gray and black-on-yellow wares, the black-on-red only having held over.¹ More striking still is the fact that ornamentation is now applied with glaze instead of paint. Nevertheless, there are indications enough to suggest that the transition from Type I to Type II was not very sudden in any sense of the word (see *e. g.* rim section in fig. 21); but as yet details on this point await investigation. The outstanding characters of the ware are as follows:—

1. *Form, Size, etc.*—Bowls predominate but jars occur, the former in sizes varying from small through medium towards large, the latter from miniature towards large. (A) Bowl bodies are hemispherical as in Type I. Rim sections mostly plain, but a few are swelled or show inward or outward curve (see Type II, fig. 21). (B) Jars have more or less vertically compressed bodies; round bottoms, wide mouth, with or without neck, with or without flaring lip. The miniature forms have short bottle necks and have two loop-handles set on the body near the neck.

¹ This black-on-red glazed ware is identical with Dr. Kidder's "Schoolhouse" pottery.

2. *Surface Finish*.—Smoothened by rubbing on one or both sides. Slip applied on one or both sides (extra thick on ornamented side), in red, yellow, and gray color, the same color covering the entire vessel.

3. *Ornamentation*.—Applied on upper half of jars and on inside of bowls (seldom outside) in the form of glaze of a color ranging from greenish-brown to black, depending to some extent on its thickness and also on color of slip beneath. Glaze sometimes crackled. In some cases the ornamental substance is of a consistency halfway between glaze and paint, in others it is a genuinely *vitrified* coating, resisting a knife point, and every bit equal to the glaze on modern crockery. Design is geometric, executed with an effort at precision but somewhat simplified in comparison with Type I, the component parts being generally done in much heavier lines than in the painted ware, because the glaze had a tendency to run and thus to spoil all attempts at a fine-line pattern. Symbolism partly the same as in Type I, partly different. Some conventionalized bird figures occur on later developments of the ware.

4. *Paste Composition*.—Resembles Type I sometimes but in general is less hard and firm, also lighter in weight. The tempering material has less of basalt and more of sand. Color of matrix varies greatly, depending evidently not on nature of clay used but on color of slip applied to vessel. Often it is gray in the center as in Type I, *e. g.*, and red near the exteriors; but in other cases it is red clear through as if coloring matter had been mixed into the paste. There is of course, also, the occasional possibility of the red color being due to oxides in the clay.

Type III

Three-color Glazed Ware (Col. 7 of Table).—The distinguishing feature of this type of pottery is that its design element, or part of it, is outlined in glaze and filled in usually with red paint, the combination design being placed on a ground color or slip of a different order such as yellow, pink, gray, and even some shade of red. This ware, while not well represented in the Table for the San Cristobal refuse heap, is diffused apparently over the entire glazed pottery area and is especially abundant in the large Tano ruins. It was in use for some time after the Spaniards came to New Mexico but is nevertheless essentially of prehistoric date. The ware is doubtless a descendant or a development with modifications, good and bad, from the preceding type, though the detailed proof of this statement remains to be worked out. But while the new type of ceramics has gained in diversity of form and general adaptability, it has lost not a little in decorative elegance. Its main characters may be summed up as follows:—

1. *Form, Size, etc.*—Bowls and jars are about equally abundant and both occur in sizes ranging from small through medium towards large. There are also a few vessels of the jug type with combination spout-handle, resembling the common Peruvian specimens of that order. Vessel walls are a little thicker than formerly but show some range. (A) Bowl bodies hemispherical. Rim sections decidedly varied in thickness and curve (see fig. 21). (B) Jar bodies more or less vertically compressed, often slightly asymmetrical, bottoms round (jars from the Keresan territory have flat or punched up bottoms), mouths wide, necks vertical or contracting, lips absent or flaring.

2. *Surface Finish.*—Rubbed smooth on one or both sides, except on inside of jugs where coiling is often left undisturbed. Two different-colored slips were generally applied to different parts of the vessel. Thus in the case of a bowl the outside bottom—the part invisible when placed right-side up—was usually painted red while the rest of the surface, inside and out, received a slip of some light shade of yellow, gray, pink or even red, which served as background for the ornamental design. In the case of a jar the lower half of the body and the inside visible portion of the neck was generally (not always) painted red while the outside of the neck and the upper half of the body received a slip in one of the several colors enumerated above, and which here also served as background for decoration.

3. *Ornamentation.*—Applied as already indicated on the outside of the neck and upper part of the body of jars and on the inside as well as on the upper outside portion of the bowls, partly with glaze and partly with paint, the latter usually red. Exceptions occur where no ornament has been added on the outside of bowls or on the neck of jars. The characterizing feature of this pottery type, *viz.*, the ornamental figures outlined with glaze and filled in with red paint, are generally confined to the neck portion of the jars and to the outside of the bowls; but sometimes the combination design does occur also on the body portion of a jar as well as on the inside of a bowl (see pl. VII), in which case the outside of the bowl is usually left blank or is merely marked by a few dashes of plain glaze. Designs mostly geometric as before, more or less crudely executed, and in part spoiled by the glaze running beyond its intended limits; quite a number of conventionalized bird figures; some more or less realistic bird figures, mammal figures, etc.¹

4. *Paste Compositions.*—Not so uniform as to be a leading character by which to identify the ware. Some of the paste is like that most common in preceding types; but in general it is more porous and brittle than formerly. The colors range through various shades of brown, red, and gray; sometimes red with a gray core, resembling the gray of previous types. The tempering material varies much in nature and quantity, fine sand, coarse sand, or crushed rock, varicolored granules of uncertain nature—perhaps crushed potsherds, etc., being used.

Accompanying the mass of type ware are a few specimens

¹ See Dr. Kidder, *op. cit.*, for illustration.

Type IV



Type III



Type II



Type I



probably of contemporary date which except for general crudeness of finish might be regarded as two-color ware of the preceding type. These are mostly miniature and small vessels of the "prayer bowl" variety, rectangular in outline, flattened bottom, more or less vertical sides, usually painted red, decorated with a few dashes of glaze and in one instance with a semi-realistic bird figure.

Type IV

Historic Two-color Glazed Ware.—This style of pottery, though very short-lived, has been singled out as a chronologic type because it is strictly characteristic of those ruined Tano pueblos that were inhabited between 1540 and 1680. It has been found also in ruins whose historic occupancy is not a matter of record, *e. g.*, at Pueblo Tunque; but here as elsewhere, the ware occurred in association with bones of domestic animals, fragments of copper, iron, porcelain, etc., and never under any other condition. The characterizing peculiarities of this pottery are its diversity of forms and its simplified but execrable decoration. In other words, the ware, while somewhat specialized and perhaps more adaptable to use, is far less artistic than formerly for the reason principally that it is not genuine Indian art but a poor European imitation. It represents the breakdown of Pueblo culture under the first century of stringent Spanish régime. The detail features of the ware may be summed as follows:—

1. *Form, Size, etc.*—Bowls, jars, platters of various odd outlines, cups or mugs with loop-handles, melon-shaped vessels, rectangular vessels, etc. Sizes range from miniature towards large. Thickness of vessel walls have considerable range. (A) Jars have more or less vertically compressed body, often somewhat angular in outline, round or flattened bottom, wide mouth, no neck as a rule, with or without flaring lip (see fig. 21). (B) Bowls show hemispherical body, convex bottom. Rim exceedingly varied in thickness and disposition, being either vertical, incurving or outcurving; lip absent or outflaring (see fig. 21).

2. *Surface Finish.*—Decidedly varied, some red ware being polished to a high degree like modern Santa Clara black pottery, some rubbed to an average degree of smoothness as formerly, and some merely scraped but not smoothed at all. A slip appears on most (not all) of the ware, usually in a gray color, sometimes yellow or cream color and occasionally red.

3. *Ornamentation.*—Applied as before on one or both sides of a bowl and on

the upper portion of the body of a jar, in the form of glaze. The color and general appearance of this glaze is a very characteristic dark brown when thickly applied and of a greenish hue when the coating is thin. Generally the iridescent glaze substance is of such striking and excellent quality as to incline one to the opinion that it was compounded after a Spanish formula. The fact that the artist could not control it at all seems suggestive of the same idea. The designs attempted, though of the very simplest geometric nature, were almost invariably ruined by the running of the glaze (see pl. VII).

4. *Paste Composition*.—Varies but slightly from preceding type, but there are exceptions of closely knit, hard and firm matrix. Normally the paste is porous and brittle. Tempering material either coarse or fine crystalline. Colors are brick red, reddish, brownish, and gray.

Type V

Modern Painted Pottery.—Whether the Tano potter actually revolted against the degenerative tendency of his art during the first three-fourths of the seventeenth century, or whether his more advanced and at the same time more conservative Keresan neighbor came to his assistance is uncertain. But the fact remains that some time prior to the Rebellion of 1680, painted pottery of a decidedly modern stamp began to replace the glazed ware at the village of San Marcos, and to a slight extent elsewhere. At Cienega and Cieneguilla the painted pottery occurs in such profusion, and with no admixture of glazed ware, as to lead one to conclude that these settlements were of post-Rebellion times, though history is silent on the subject. Now it happens that ware of this sort is found in considerable abundance at the ruins of Pueblo Kotyiti (excavated 1912) and also at the nearby ruins of Pueblo Kuapa of earlier date in the Keres country to the west of the Rio Grande. In the Tano ruins of pre-Rebellion times it is scarce, however, and may not occur in quantity except at San Marcos. For this reason we may dismiss it for the present with a few delineatory remarks.

The material at hand for the Tano ruins consists of but a few fragments and it will therefore be impossible to go into any details. Bowls and jars both occur, possibly also other forms. Seemingly there are no more vertical jar rims, but the bowl rims show at least several of the former variations. Vessel surfaces are more or less well rubbed. The undecorated portions of the ware—bottoms, etc.

—are generally painted red, the other portions ordinarily a light pink. The ornamentation, placed on this pinkish ground-color, is done with black paint. Sometimes the figures are merely outlined with black paint and filled in with red paint, as in Type III. The decorative lines are generally thin, straight or curved and done with only a fair amount of precision. All designs are geometric, with some few of a semifloral nature. The vessel walls are rather thicker than formerly. The paste is of light weight, porous, and brittle, containing a good deal of sand. Its color ranges between red and dull yellow, the latter resembling at times the color of unburned adobe.

SUMMARY

The present paper is, of course, not a study of Tano ceramics but merely an attempt to establish the basis for a chronology. To that end the principal styles of pottery have been described in more or less tedious detail chiefly to convince the student that the differences, particularly of the so-called successive types, are real and not imaginary. Only the grand divisions, peculiar not to the Tano district but in a measure to the whole glazed pottery area, have been considered and merely from a concrete or objective point of view. Subdivisions of styles, such as "Frijolitan" and "Standard Pajaritan" suggested by Dr. Kidder probably exist also in Tano ceramics. At any rate transition material is present. But these are matters for future discussion.

The principal difficulty in making the classification has been to devise a terminology that shall be readily intelligible and also simple enough to be permanently useful. Both archeology and geology suffer confusion by the use of geographic words that are meaningless without an appended definition. For that reason I have avoided repeating Dr. Kidder's terms such as "Schoolhouse," "Frijolitan," "Pajaritan," etc., though the latter two are both convenient and expressive and may for all I know be desirable labels for local modifications of a particular type of glazed pottery. On the other hand, a terminology that is self-explanatory is necessarily clumsy. Still, for the present, I see no scheme more convenient in the prose-

cution of my own work than the preceding classification which may here be summarized.

Type I. Two and Three Color Painted Wares.

1. Black-on-white.
2. Black-on-red.
3. Black-and-white-on-red.

Type II. Two Color Glazed Wares.

1. Black-(or brown)-on-red.
2. Black-(or brown)-on-yellow.
3. Black-(or brown)-on-gray.

Type III. Three Color Glazed and Painted Wares.

1. Black-glaze-and-red-paint-on-gray.
2. Black-glaze-and-red-paint-on-yellow.
3. Black-glaze-and-red-paint-on-pink.
4. Black-glaze-and-red-paint-on-red.

Type IV. Historic Two Color Glazed Wares.

1. Brown-(or green)-on-gray.
2. Brown-(or green)-on-red.
3. Brown-(or green)-on-yellow.

Type V. Modern Painted Wares.

1. Black-on-pink.
2. Black-and-red-on-pink.

The above types of pottery succeed each other in the order given; but accompanying them from beginning to end, without undergoing any marked changes are two additional types, viz.:

1. Corrugated or coiled ware.
2. Biscuit ware (*i. e.*, a surviving variety of black-on-white ware).

APPLICATION OF CHRONOLOGICAL DATA TO THE TANO RUINS

Accepting the foregoing chronological deduction as essentially correct, we may properly conclude this study by trying out our scheme on some of the ruins in the territory to which it applies. A limited amount of data in the way of potsherds, etc., is available for several subdivisions of the glazed pottery area and judging from these it seems probable that the entire region underwent about the

RUINS OF THE TANO DISTRICT, NEW MEXICO

No.	Name of Locality	Pre-Pueblo Period	Pueblo Periods					No. of Rooms Excavated
			I	II	III	IV (1540-1680)	V (1680 on)	
1	White Rock Cañon, No. 1		X	X				
2	" " " " 2		X	X				
3	Boom Camp		X	X				
4	Los Aguajes			X	X			33+
5	Santa Fé		X					
6	Agua Fria, No. 1		X					
7	" " 2		X	X				
8	Cieneguilla		X	X	X		X	132
9	Cienega, No. 1						X	
10	" " 2			X				
11	" " 3		X					45
12	" " 4	X						Trenched
13	La Bajada, " 1		X					
14	" " 2			X	X			84+
15	Canyoncito, " 1			?	X			9+
16	" " 2				X			
17	" " 3		X					
18	" " 4	X						
19	Arroyo Hondo, " 1		X					12
20	" " 2		X	X				108+
21	Peñas Negras		X					
22	Chamisalocita Cañon		X					44+
23	Alamo Cañon		X					27+
24	Mansanaria, " 1		X					Trenched
25	" " 2		X					5+
26	Lamy " 1		X					
27	" " 2		X					2
28	" " 3		X					17
29	San Marcos		X	X	X	X	X	172+
30	Cañon Casita		X					
31	San Cristobal		X	X	X	X	?	239+
32	Largo			X	X			13+
33	Colorado			X	X			47+
34	Shé		X	X	X			28+
35	Blanco		X	X	X			47+
36	San Lazaro		X	X	X	X	?	60+
37	Galisteo		X	X	X	X	?	25+
38	Gipuy (Old Domingo)			X	X			
39	Ojito Juan Pedro			X				
40	Pinavetitas Cañon				X			
41	San Pedro Viejo (2)	(X)	X	X	X	X	?	174+
42	Uña de Gato, No. 1		X					
43	" " 2			?	X			
44	Tunque			X	X	X		239+
45	Algodones	X						
Totals		4	29	21	19	6	3	1562

same stylistic changes. But for present purposes it will be enough to illustrate the possibilities of chronological determination by applying the facts at hand to the Tano district from which alone our data are nearly complete. Substituting for the five successive pottery types a corresponding number of time periods we get the following results, set forth in tabular form.

The table must for the present be left to speak for itself. It is not complete in some respects and it may even be incorrect on two or three points; but the final report on the alignment of the Tano ruins will not differ very much from the indications above presented. Of particular interest is the steadily decreasing number of ruins marking the successive Pueblo periods, but until the capacities of the various ruined villages have been estimated it is useless to put definite constructions upon the figures. The offhand impression is, however, that the housing facilities during the first three periods of Pueblo history in the Tano district remained very nearly uniform because as the villages decreased in number they increased in size. This might mean among other things that the population remained fairly stable.

In conclusion it may be well to repeat that the foregoing attempt to establish a chronology is based on purely concrete and numerical data. It is a study largely of small fragments of pottery, their number, nature, and physical contact relations. But the case for chronology can be strengthened by the investigation of architectural modifications, although these at best cannot serve as a sound classificatory basis. Furthermore, when the very considerable quantities of crushed pottery vessels obtained during three seasons of excavation have been assembled and put in shape for comparative study it should be possible to observe either a series of sharp breaks in the symbolism on the pottery, or else a gradual development of motifs. Such a study it now seems probable will show that the successive styles of ceramics arose the one from the other and that therefore, by inference, we may assume a relatively steady and uneventful career for the people inhabiting the Tano territory.